

Force10 Networks Dynamic Cloud Infrastructure

Application
NOTE

Dynamically optimize infrastructure to meet application demand while cutting operational expenses and reducing capital costs.

The data center has been, and continues to be, one of the key resources of innovation helping businesses become more agile and efficient while reducing total cost of ownership (TCO) — as well as being the focal point for green IT initiatives. The first steps are widely underway, with data center consolidation bringing back the idea of the centralized glass room, enabling better control over fixed costs. Virtualization helps drive up utilization of existing server compute and storage assets, reducing sprawl, while also helping to reduce the power and cooling footprint.

The next phase of data center evolution is aimed at helping applications dynamically adjust to load. Referred to as Services Oriented Architectures – or SOA – a few years ago, it is now being mixed in with the likes of cloud computing and cloud networking.

The tools are in place to usher in a new way of thinking about making the traditionally static networks ‘dynamic’, whereby the network itself responds automatically to requests for more, or indeed less bandwidth, provisioning network access, security and QoS, all without human intervention.

This application note explores the means by which existing data center assets can be repurposed to increase utilization, and improved application agility.

Building the Cloud – Dynamic optimization of the virtualized Data Center

It’s a competitive world out there. Traditionally-managed data centers seldom are able to respond to changes in demand, resource health, or business policies quickly or reliably enough. Low utilization of server and network resources results in wasteful sprawl and excessive over-

provisioning in anticipation of service demand spikes, spare capacity that still seems inadequate to avoid service interruptions and incompletely covers all the applications critical to the business. Data center managers face brittle application “silos” connected by opaque networks that seem to conspire to hide meaningful performance and diagnostic information, withhold effective controls to affect runtime efficiency, and resist service delivery optimization. The enterprise comes to view its IT infrastructure not as a flexible, reliable backbone that can responsively enable the business to grow and pursue maximum competitive advantage, but as a rigid, fragile web of fixed capacity, slow and expensive to adapt to new or changing demands and quickly degrading when stressed.

Enter “cloud computing” (also closely related to “utility computing” and “grid computing”). Cloud computing describes a new paradigm for the delivery of low-cost, scalable, metered/billed, resilient, and scalable application services. Unlike the old methodology that bound applications tightly to individual statically-configured compute and networking resources, cloud computing unleashes the applications services from close association with any particular resource, enabling both smooth scaling of the services to the enterprise without regard for the resources underneath, and higher availability of all services as a result of the mobility of the underlying resource mapping.

The “on demand” nature of the cloud computing infrastructure model requires continuous optimization of the allocation of server and network resources to meet the dynamic demand of each application. This new, powerful model for scalable service delivery cannot be accomplished using traditional manual IT methods and inflexible tools. Just as the introduction of automated telephone

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switches necessarily replaced manual switchboards to enable today's reliable and inexpensive worldwide telecommunications services, IT needs intelligent automation and flexible high-speed switching to transform the data center into an efficient, self-optimizing, highly-available, accountable service delivery fabric, and this is precisely Force10's vision of network automation.

Compute Clouds Are Made of This

Infrastructure management software brings policy-based automated administration of heterogeneous data center environments into reality. The Force10 network management interfaces enable software that is capable of pooling a wide variety of virtual and physical servers into a single managed resource, and automatically and continuously optimizing allocation of those resources to the applications that provide the services critical to the enterprise. No more grossly-over-provisioned application silos. All applications enjoy automatic server replacement in the event of a failure. Service levels of every application are freely scalable and maintained within policy bounds without human intervention. Dramatic cost savings accrue, both capital and operational expense, as fewer servers are managed to provide increased services at higher utilization. Suddenly, there is the flexibility and agility to turn business on a dime and add new applications or services with no need to procure new dedicated hardware for each app. And, management enjoys transparency into actual deployment and utilization of assets in the service of the enterprise, and the ability to meter and bill users "by the drink".

Multiply overall data center efficiency and increase service levels using fewer resources at greater energy efficiency.

Network Automation

The network is the cloud. It's impossible to continuously optimize and re-optimize server allocations to applications and services without a fast, reliable, and flexible network. Force10 supports standards-based management protocols such as SSH and Telnet to automatically configure switch/router ports using Force10's industry-standard CLI or SNMP. By assigning VLANs or applying QoS attributes to guarantee the right network configuration, SLAs can be delivered for critical applications. Force10's purpose-built resilient and scalable GbE and 10 GbE infrastructure removes risk and lowers TCO through reduced complexity, using fewer physical servers and switches, and improves lifecycle management. FTOS (Force10 Operating System), based on Unix-like modular NetBSD, enables collection of real-time traffic statistics via sFlow for each Virtual Machine (VM) and end user conversations, resulting in granular bandwidth optimization and control.

Three Steps to the Cloud

Knowledge: Is your starting point a heterogeneous collection of platforms, virtual and physical, supporting myriad applications and services, collectively so complex as to be daunting today? Force10's VirtualView provides critical intelligence about the configuration, utilization, efficiency, and reliability of both the servers and the networks in the data center. Knowledge and data inform effective action: profiling software discovers, maps, and profiles your applications and the server resources they consume, providing crucial recommendations about which servers can be virtualized, pooled, or simply decommissioned, and what policy-driven automation would best optimize allocation of the resources. Already virtualized? VirtualView provides a coherent and actionable view of usually-invisible traffic generated by VMs in your environment.

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Power: Combining autonomous management software with Force10's network infrastructure, there is a natural and readily-implemented first step into policy-based optimization of the data center: managing the power and cooling by dynamically turning off unused servers and powering down unused switch ports. Management software is application-aware, understanding not only how to safely shut down and restart complex application software stacks, but dependencies between applications and the network resources they require. By monitoring demand, responding to events, or reacting to directives, management software can save significant amounts of energy, often 50% or more, reducing carbon footprint, saving money, and potentially avoiding the premature need to build-out a new data center – a horribly expensive and disruptive activity.

Utility: The ultimate IT system is one that manages, optimizes, and heals itself, responding smoothly and flexibly to changes in demand and operating conditions, consistently maintaining service levels in the green while merely sipping energy and making the most efficient use of available resources at the least cost. Call it a “utility”, call it a “cloud”, from the perspective of the Enterprise, it is a power source for scalable services, requiring no more consideration of the actual source (servers, storage, or network connectivity) enabling the service than is required when one plugs an electrical appliance into a wall socket. Management software enables pooling of servers and dynamic allocation of those resources as needed to optimize service delivery to match

demand according to Enterprise policy. And now Force10's network switches and routers can be automatically configured on the fly to support those optimized services. Force10 is delivering cloud infrastructure today, providing improved energy efficiency, increased application availability, and the agility and economy from dynamic resource repurposing.

Create “internal clouds” to increase resource utilization and agility resulting in increased application availability and flexibility.

Traditional Static Data Center	Cloud Computing Data Center
Pre-provisioned resources—rigid, server silos – dedicated servers per application	Resources can be tuned and re-purposed to the environment, reducing real costs, improving TCO
Server CPU utilization often in single digits	Server utilization optimized by correct server loading and consolidation
Scale through adding hardware	Scale through optimizing utilization and with dynamic hardware provisioning
Fixed power and cooling costs	Variable power control based on business needs, powering down idle assets. Deliver on Green IT Initiatives
Future Extensions	
Hard wired bandwidth	Dynamic bandwidth, applied as needed through policies
Rigid server or storage domains	Better utilization and resource allocation through global and local adjustment of server or storage domains
Manually adjust security or QoS policies	“Follow me” security or QoS policies

Table 1. Benefits of Force10 Networks in the cloud computing data center.



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